CLAIMS

1. A method for locating an emitter of electromagnetic waves utilising a plurality of receivers, the method comprising the steps of:-

a) detecting the times of arrival of said electromagnetic waves at said receivers;

b) computing the relative time differences of arrival between said receivers using said detected times of arrival;

c) estimating the position of the emitter from said computed relative time differences of arrival; and

d) correcting said detected times of arrival for path length discrepancies caused by the earth's atmosphere;

characterised in that step d) includes the additional steps of:-

e) measuring time differences of arrival between pairs of said receivers;

f) obtaining an estimate of emitter position assuming a straight-line path between each receiver and said emitter;

g) obtaining the ground range from each receiver to said emitter using said estimate of emitter position;

h) using said ground range and an assumed profile in a selected ray-tracing integral equation to predict actual path length;

i) obtaining the difference between said predicted path length and said straight-line paths to form corrections to said time differences of arrival;

j) repeating steps e) to i) until said corrections converge; and

k) applying said converged corrections to correct said detected times of arrival of said electromagnetic waves at said receivers.

2. A method according to claim 1, wherein step e) utilises at least three pairs of receivers.

3. A method according to claim 1 or 2, wherein said path length discrepancies are caused by refraction, and said selected ray-tracing integral equation comprises:

$$R = \int_{h_0}^{h_1} \frac{n(h)}{\sqrt{1 - \left[\frac{n_0 \cos(\theta_0)}{n(h)\left[1 + \frac{h}{re}\right]^2}\right]}} .dh ,$$

where R is the path length, n (h) describes the atmospheric refractive profile as a function of height, n_0 is the refractive index at the earth surface, θ_0 is the take-off angle of the ray at the emitter, h_0 and h_1 are the start and end heights of the path, re is the earth radius.

4. A method according to any one of claims 1 to 3, wherein step d) further utilises a Kalman filter for improving said correction.

5. A method according to any one of the preceding claims, wherein each receiver is mounted on a respective airborne platform and said emitter is either ground-based or airborne.

6. A method according to any one of claims 1 to 4, wherein each receiver is mounted on a respective ground-based platform and said emitter is airborne.

7. Apparatus for carrying out the method according to any one of the preceding claims, the apparatus comprising:-

a plurality of receivers, each receiver including means for detecting the time of arrival of electromagnetic waves received thereat;

means for computing the relative time differences of arrival between said receivers and for estimating the position of the said emitter; and

means for correcting said detected times of arrival for path length discrepancies caused by the Earth's atmosphere.

8. A computer program comprising program code means for performing the method steps of any one of claims 1 to 6 when the program is run on a computer.

9. A computer program product comprising program code means stored on a computer readable medium for performing the method steps of any one of claims 1 to 6 when the program is run on a computer.

10. A computer loaded with a computer program according to claim 8 or a computer program product according to claim 9 for carrying out the method according to any one of claims 1 to 6.